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ENTOMOLOGY.[1]

Evolution and Taxonomy.—Under this general title Professor J. H. Comstock has published an extremely important and suggestive easay.[2] Starting with the evident proposition that the systematists of to-day are not making as much use of the theory of descent in taxonomic work as they might, the author suggests that "the logical way to go to work to determine the affinities of the members of a group of organisms is first to endeavor to ascertain the structure of the primitive members of this group; and then endeavor to learn in what ways these primitive forms have been modified by natural selection, keeping in mind that in each generation those forms have survived whose parts were best fitted to perform their functions." Some of the difficulties to be encountered in the carrying out of this suggestion are next considered. "As the structure of a highly organized animal or plant is too complicated to be understood in detail at once, it is suggested that the student begin with the study of a single organ possessed by the members of the group to be classified." He is to observe the forms and functions of this organ; and to determine its primitive form and the various ways in which the primitive form has been modified. Then another organ is to be selected and results compared. In this way a provisional classification can be made.

The second part of Professor Comstock's essay considers the evolution of the wings of insects. The method above suggested is here applied to the wings of the Lepidoptera; and is followed by a contribution to the classification of the Lepidoptera which forms the third part of the essay. This classification is a provisional one, but the author confidently expects "that the principal conclusions stated here will be confirmed by a study of other parts of the body; for in Nature's court the testimony of different witnesses, if rightly understood, will agree."

The proposed classification is indicated in the following table:

[1] Edited by Clarence M. Weed, New Hampshire College, Durham, N. H.

[2] Evolution and Taxonomy. An essay on the application of the theory of natural selection in the classification of animals and plants. Illustrated by a study of the evolution of the wings of insects and by a contribution to the classification of the *Lepidoptera.*—Reprinted from the Wilder Quarter-Century Book—Comstock Publishing Co. Ithaca, New York.

A. Suborder JUGATÆ.
  B. *The Macrojugatæ* Family HEPIALIDÆ.
  BB. *The Microjugatæ* Family MICROPTERYGIDÆ.
AA. Suborder FRENATÆ.
  B. *The Microfrenatæ.*
    C. *The Tineids* Superfamily TINEINA.
    CC. *The Tortricids* Superfamily TORTRICINA.
    CCC. *The Pyralids* Superfamily PYRALIDINA.
  BB. *The Macrofrenatæ.*
    C. *The Frenulum-conservers.*
      D. Moths in which the reduction of the anal area of the hind wings precedes the reduction of the anal area of the fore wings. No N. American species. *Castnia* an example.
      DD. Moths in which the reduction of the anal area of the fore wings precedes the reduction of the anal area of the hind wings.
        E. *The Generalized Frenulum-conservers.*
          F. Moths in which a great reduction of the subcostal cell of the hind wings is taking place.
            G. Moths in which the anal veins of the fore-wings anastomose so as to appear to be branched outwardly. Family MEGALOPYGIDÆ.
            GG. Moths in which the anal veins do not anastomose in such a way as to appear branched outwardly. Superfamily ZYGÆINA. (in part)
          FF. Moths in which the subcostal cell of the hind wings is not greatly reduced.
            G. Moths in which the anal veins of the fore-wings anastomose so as to appear to be branched outwardly. Family Psychidæ.
            GG. Moths in which the anal veins do not anastomose in such a way as to appear branched outwardly.
              H. Family COSSIDÆ.
              HH. Family LIMACODIDÆ.
        EE. *The Specialized Frenulum-conservers.*

F. DIOPTIDÆ.

FF. *The Geometro-Bombycids and the Geometridæ.*

Families NOTODONTIDÆ, BREPHIDÆ, GEOMETRIDÆ.

FFF. *The Noctuo-Bombycids and the Noctuids.*

Familes CYMATOPHORIDÆ, NOCTUIDÆ.

LIPARIDÆ, AGARISTIDÆ, and ARCTIIDÆ.

FFFF. *Isolated families of specialized frenulum conservers*

Families SESIIDÆ, THYRIDIDÆ, SPHINGIDÆ, and Superfamily ZYGAEINA.

CC. *The Frenulum-losers.*

D. *The Frenulum-losing Moths.*

Superfamily SATURNIINA and families DREPANIDÆ and LASIOCAMPIDÆ.

DD. THE SKIPPERS.—Butterflies in which all of the branches of radius of the fore wings arise from the discal cell. Family HESPERIDÆ

DDD. *The Butterflies.*—Butterflies in which some of the branches of radius coalesce beyond the apex of the discal cell.

Families PAPILIONIDÆ, PIERIDÆ, LYCÆNIDÆ and NYMPHALIDÆ.

The essay is illustrated by an admirable plate engraved on wood from Nature by Mrs. Comstock and a large number of ink drawings by Mr. E. P. Felt.

Habits of Halobates.—Mr. James J. Walker of the British Royal Navy has recently published[3] an account of his observations on the peculiar bugs of the genus Halobates. He has studied them in many seas for several years, finding the habits of the various species much alike. "In tropical latitudes, when a sailing ship is becalmed, or a steamer is stopped for any purpose on a perfectly calm sea, it is not long before little whitish creatures are seen rapidly swimming over the glassy surface with a sinuous motion, and soon half a dozen or more Halobates are in view at once, evidently attracted by the bulky hull of the ship which they will approach frequently within arm's length. Their progress seems to be effected by a sort of skating action of the long, ciliated, intermediate and hind legs. When the ship is anchored in a current or tide way, they keep abreast of her by a series of short rushes of a foot or so against the stream, giving a speed quite sufficient to stem a current of two or three knots per hour. * * * They seem to like the sunshine and were much scarcer when it was overcast. A heavy swell, provided the weather is quite calm, does not prevent their appearance, but with the ripple caused by the slightest breeze they vanish at once. * * * I have kept the Chinese species alive for several days in a vessel of sea water, at first they are very restless, rushing about and occasionally jumping up two or three inches from the surface, but after a few hours they became much quieter. They then rest on the water with the legs widely extended, and the intermediate pair brought forward so as to have the tarsi in advance of the head. On the approach of a pencil or the finger they dive readily, and swim with great facility beneath the surface, the air entangled in the pubescence giving them a beautiful appearance like that of a globule of mercury or polished silver. This supply of air must be essential to the existence of the insects, which I feel sure must pass a large part of their life beneath the surface of the sea, diving into undisturbed water in rough or even moderate weather, and coming up again only when it is absolutely calm."

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[3] Ent. Month. Mag. 2d. ser. v. IV, p. 227.

Mr. Walker is unable to add anything to our knowledge of the feeding habits of these bugs. "The union of the sexes takes place on the surface of the sea, and the eggs are unquestionably carried about by the female attached to the extremity of the abdomen for some time before she parts with them." Two females of *H. Wulderstorffii* were taken from the Marquesas Islands with eggs thus attached. The eggs are large for the insect, cylindrical with rounded ends, and ochraceous yellow. Where they are finally deposited he did not observe though[4] in a subsequent note attention is called to Witlaczil's record of the finding of a bird's feather at sea covered with the eggs of Halobates.

Pupation of Gyrinus and Dineutes.—Mr. H. F. Wickham continues his studies of the early stages of North American Coleoptera, his latest contribution[5] including descriptions of nine species. He describes the larva of *Gyrinus picipes* as pupating in mud cells without any intermixture of silk. "Probably the larva uses any readily accessible matter in the formation of its cell and when under stones would use mud, while if under bark might utilize wood or bark fibre, thus giving the 'cocoon' a papery consistence." The pupation of *Dineutes assimilis* is described thus: "The larvæ on coming out of the water repair to the under surface of a stone or a board close enough to the waters edge to insure continued dampness, and there construct an oval cell of earth, without any admixture of silk so far as I can find. These cells are not simple excavations of earth beneath the stone but are built upon it like the cells of some of our mudwasps, and are not very unlike them in shape."

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[4] lc. p. 252.

[5] Bull. Lab. Nat. Hist. Univ. of Iowa. II, pp. 330—344, pl. IX.

Hermann August Hagen.—This veteran entomologist, for many years Professor of entomology at Harvard College, died at his home in Cambridge, Nov 9 last. Born in Königsberg, Prussia, May 30, 1817, he graduated in medicine in 1840, and was a practicing physician in Königsburg until 1867. He then, at the invitation of the elder Agassiz, came to Cambridge to become Curator of the entomological department of the Museum of Comparative Zoology, a position which he retained until his death, though because of ill health he has not been actively at work for several years. Dr. Hagen has long been known as an authority in entomology, especially on the Neuroptera and their allies; and by his work at the Museum has greatly helped the development of the science in America.

Entomological Notes.—Professor L. M. Underwood has edited and the U. S. National Museum has published (Bull. 46) the papers on North American Myriopoda written by the late C. H. Bollman. The Bulletin covers more than 200 pages and must form the basis of future work on this neglected group.

At the meeting of the London Entomological Society, Oct. 4, specimens of Lepidoptera which had been exposed in the pupa stage to low temperatures were exhibited by Mr. F. Merrifield . " *Vanessa polychloros* was much darkened, especially toward the hinder margin, by a low temperature. *Vanessa c-album* showed effects on both sides, especially in the female; they were striking on the under-side. Some *Vanessas* showed the gradual disintegration, by exposure to a low temperature, of the ocellus on the fore wing, which in extreme specimens ceased to be an ocellus."

Various species of Vespa have been so abundant the past season in Great Britian that accounts of the "Plague of Wasps" have been occasionally published. Their unusual abundance is attributed to recent favorable meteorological conditions.

The U. S. National Museum has published in the Proceedings (No. 950) "A Descriptive Catalogue of the Harvest-spiders (Phalangiidæ of Ohio" by Clarence M. Weed. Fifteen species or subspecies are included in the list.

Prof. J. B. Smith describes [6]the new genus Tristyla with one species, and seven other new species of Noctuidæ collected by the Death Valley expedition.

In reporting on a collection of ants from Lower California and Sonora, Mexico, M. Theo Pergande describes[7] two new species of Camponotus and one each of Atta and Aphænogoster, as well as a new variety of *Pogonomyrex badius* Ltr.

Mr. Lawrence Bruner furnishes as his report as Entomologist to the Nebraska State Board of Agriculture a valuable discussion, covering more than one hundred pages, of the Insect Enemies of the Small Grains. The list includes 143 species distributed among the orders thus: Diptera, 24; Hymenoptera, 11; Lepidoptera, 22; Coleoptera, 33; Hemiptera, 28; Thysanoptera, 2; Orthoptera, 18; Thysanura, 3; Acarina, 2.

The peculiar pocket like abdominal appendages of female moths of the family Acræidæ are believed by A. F. Rogenhofer to be used in copulation.[8]

From recent studies of the pupæ of moths Dr. G. A. Chapman concludes[9] that the Pterophoridæ are not closely related to the Pyralidæ or Alucitidæ.

The discussion concerning the "highest" order of insects has been recently continued in *Science* by Packard, Smith and Riley, all of whom favor the placing of the Hymenoptera above the Diptera.

From recent anatomical studies, Krasilstschik concludes[10] that Phylloxera and Chermes should form the family Phylloxeridæ and should be regarded as more primitive than the Aphididæ or Coccidæ.

Dr. C. V. Riley's report as entomologist to the U. S. Department of Agriculture for 1892 discusses recent international exchanges of beneficial insects, the importation of two dangerous insects—the potato tuber worm (*Lita solanella* Boisd.) and the Olive Pollinia (*Pollinia costæ* Targ,)—the spread of the horn fly, the ox bot, the rose sawflies, the strawberry weevil, the elm leaf beetle and experiments with the European white grub fungus. In addition to these discussions there is a brief review of the work of the field agents of the division, and summarized accounts of the pea and bean weevils, the sugar-beet web worm (*Loxostege sticticalis* L.), the sugar-cane pin borer (*Xyleborus perforans* Woll.), and the new insectary of the department.

[6] Insect Life, V, 328—344.

[7] Proc. Cal. Acad. Sci., ser. 2, v. IV, pp. 26—36.

[8] J. R. M. Soc., 1893, p. 322.

[9] Trans. Ent. Soc. London, 1893, p. 97 et seq.

[10] Zoolog. Anzeiger, 1893.

A number of interesting entomological papers have been published by Mr. F. M. Webster in the third issue of the technical series of the Bulletin of the Ohio Experiment Station. Many new species of insects are described by specialists. The publication of these new species in such a bulletin is certainly of questionable propriety, unless they also appear in entomological journals. Such bulletins are of decided value and are useful outlets for much matter that accumulates in pursuance of station work—such as biographies, faunal lists, etc.—and it is desirable that they be confined to this instead of containing isolated descriptions of new species.